ECONOMIC SCIENCE
IN RELATION TO PRACTICE

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Economic Science in Relation to Practice

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ECONOMIC SCIENCE IN RELATION TO PRACTICE

§ 1. The title that I have chosen for this lecture is "Economic Science in Relation to Practice." On that text I have tried to put together some reflections of a general kind. I have imagined to myself someone who should say: "To what end is the study of Economics? What is its value and what is its meaning? We have been invited to join in pursuing it. Show us the reason Why?"

§ 2. Now, before I frame in answer to that question any direct *apologia*, I would ask indulgence for one personal word. The *reason* by which we justify any pursuit is sometimes—perhaps is often—different from the *cause* that first turned us to it. That is the case with me. The cause of my first interest in economic science was not a reason, but the personal inspiration of the master whose successor and whose pupil it is my high privilege to be. The Chair of Political Economy in Cambridge is still illustrious with his name. Of my own debt to him—

a debt which all his pupils share—this is not the place to speak.

> Ecco di qua chi ne dara consiglio,
> Se tu da te medesmo aver nol puoi.

It will be my earnest endeavour to carry on and to develop in this University the work that he has begun, and to pass forward to others what I have learnt from him.

§ 3. I have spoken of an *apologia* for the study of economic science. It is plain that the fashioning of that involves trespass beyond the domain of economic science itself. It makes necessary an estimate of values in the ethical sense, and, therewith, an entrance into the province of moral philosophy. There is an old distinction between things that are good in themselves and things that are means to good. It is commonly, though not universally, held that the only things known to us that are good in themselves are states of consciousness of sentient—especially of human—beings. If this be so, the attainment of any particular sort of knowledge can only be good—or bad—so far as it affects such states of consciousness. It may do this in either—or both—of two ways. First, the new knowledge, by simply entering into the consciousness of any person, modifying perhaps in the act its other constituents, may *directly* alter the value or goodness of that consciousness. Secondly, the knowledge may make possible the introduction of various changes in our environment, such as the provision of more abundant food, and may

thus *indirectly* alter the value or goodness of the conscious lives that are affected. To put the same point more roughly, we may say that a piece of knowledge may be either valuable for its own sake or valuable in its uses: it may be worthy of pursuit either for its light-bearing or for its fruit-bearing qualities.

§ 4. Now, if we look at some of the great sciences to which a large part of the activity of this University is devoted, we find that the comparative stress in their appeal upon light-bearing and upon fruit-bearing qualities varies very greatly. In nearly all, indeed, there is some blending, but the proportions of the blend are different. At one end of the scale, perhaps, we may place the most general science of all, the science of reality, metaphysics. Of the student of that science it is, indeed, true that "he yet may bring some worthy thing for waiting souls to see"; but it must be light alone, it can hardly be fruit that he brings. Most nearly akin to the metaphysician is the student of the ultimate problems of physics. The corpuscular theory of matter is, hitherto, a bearer of light alone. Here, however, the other aspect is present in promise. Who knows but that speculations concerning the structure of the atom may lead one day to the discovery of practical means for the dissociation of matter and for rendering available to human use the overwhelming resources of intra-atomic energy? Turn again to biology. There the fruit-bearing aspect is more prominent. Recent studies upon heredity—they are largely

Cambridge studies—have, indeed, the highest scientific interest; but no one can reflect upon that without at the same time reflecting upon the striking practical results to which they have already led in the culture of wheat, and upon the far-reaching, if hesitating, promises that they are beginning tentatively to offer in regard to the culture of man. And so, if I had the knowledge, I might go on through a list of the natural sciences. But I turn rather to that group which is concerned primarily, not with man's environment, but with man himself. Look first at the sciences whose subject-matter is man as an individual. Here too there is the same variation of blending as before. In psychology the theoretic interest is dominant—particularly, as I think, on that side of it which gives data to metaphysics; but psychology is also valued in some measure as a basis for the practical art of education. In human physiology, on the other hand, the theoretic interest, though present, is subordinate, and the science has long been valued mainly as a basis for the art of medicine. Last of all we come to those sciences that deal, not with individual men, but with groups of men; that body of infant sciences which some writers call sociology. Light on such laws as may lie behind development in history, even light upon particular facts, has, in the opinion of many, high value for its own sake. It would ill become me here to say anything in depreciation of that claim. But I must say—for to me it is fundamental—that, in respect of the sciences of human society, be their appeal as bearers of light never so high, it is through their promise of fruit and

not of light that they chiefly merit our regard. I recall the celebrated, if somewhat too strenuous, passage from Macaulay's Essay on History: "No past event has any intrinsic importance. The knowledge of it is valuable, only as it leads us to form just calculations with regard to the future. A history which does not serve this purpose, though it may be filled with battles, treaties and commotions, is as useless as the series of turnpike tickets collected by Sir Matthew Mite". That paradox is partly true. If it were not for the hope that a scientific study of men's social actions may lead, not necessarily directly or immediately, but at some time and in some way, to practical results in social improvement, I should myself—I do not pretend to speak for others—I should myself regard the time devoted to that study as time misspent. That seems to me true of all social sciences, but especially true of Economics. For Economics "is a study of mankind in the ordinary business of life"; and it is not in the ordinary business of life that mankind is most interesting or inspiring. If I desired knowledge of man apart from the fruits of knowledge, I should seek it in the history of religious enthusiasm, of passion, of martyrdom and of love; I should not seek it in the market-place. When we elect to watch the play of motives that are ordinary in man—that are sometimes mean and dismal and ignoble in man—our impulse is not the philosopher's impulse, knowledge for the sake of knowledge, but rather the physiologist's, knowledge for the healing that knowledge in some measure may help to bring.

§ 5. This impulse, even to those who realise most clearly the great progress in social well-being that recent times have witnessed, is rightly a commanding one. The evil that remains is great. In modern England and modern America, for all their enormous wealth, books like *No. 5 John Street* and even like *The Jungle* can be written and can be recognised as not wholly alien from truth. The least imaginative among us sometimes sees with vividness the faces of the suffering and the degraded who have been worsted in the industrial struggle. The contrast between the luxury of some and the penury of others is evident. The phrase of the Angelic Doctor is apposite and stern: "Dost think thou committest no injustice by keeping to thyself alone what would be the means of life to many? . . . . It is the bread of the hungry thou keepest, it is the clothing of the naked thou lockest up." No doubt, those who feel these things most keenly are not always economists. Sometimes, impatient of much inquiry and little action, they may lay upon economists and economic science a common anathema. Nevertheless, their impulse and the student's impulse are one, and the academic person who would meet them with an epigram is no true economist. "Enthusiasm," it has been well said, "is often a turbid issue of smoke and sparks. Culture might refine this to a steady glow. It is melancholy when, instead, it takes to pouring cold water on it." I shall be glad if a man comes to Economics because he has been interested by Professor Edgeworth's *Mathematical Psychics* or Dr. Fisher's *Appreciation and Interest*: just as I shall

be glad if he comes to it because he is looking forward to business and wishes to learn something of the broader aspects of his future career; but I shall be far more glad if he comes because he has walked through the slums of London and is stirred to make some effort to help his fellow-men. Wonder, Carlyle said, is the beginning of philosophy: social enthusiasm, one might add, is the beginning of economic science.

§ 6. This leads me to another point. If practice is the impulse to the economist's work, it is plain that Economics cannot stand alone. For our science is not a normative but a positive science. It is concerned, not with what ought to happen, but with what tends to happen. Hence, it cannot, of itself, lay down any precepts of reform. It inquires, just as physiology inquires, what effects would follow if a given cause were introduced; it does not profess to pass judgment on questions of the relative goodness-in-themselves of various states of conscious life. That is a matter for Ethics. In the court of that higher discipline we learn—or try to learn—something concerning that. When we have learnt it, Economics adds: Such and such an action, whether of a government or of a municipality or of a voluntary association or of an individual man, is likely to alter conscious life in such and such a way. Then, and not till then, we are in a position to conclude: The effects of such and such an action are likely to be good (or bad). Hence, Economics and Ethics are mutually dependent. The practical art of social service requires them both.

The first is hand-maid to the second. It is essential for the full fruitfulness in practice of either of them that the other should progress. May I add that it is an urgent need for the economist that he be also a student of Ethics ?

§ 7. Now, if this conception of the function of Economics is accepted, there follow certain conclusions concerning its broad general character. There are two sorts of positive sciences. On the one side are the sciences of Formal Logic and Pure Mathematics, whose function it is to discover *implications*. On the other side are what I may call the realistic sciences, such as physics, chemistry, and biology, which are concerned with actualities. The distinction is drawn out in Mr. Russell's *Principles of Mathematics*. "Since the growth of non-Euclidean Geometry, it has appeared that pure mathematics has no concern with the question whether the axioms and propositions of Euclid hold of actual space or not: this is a question for realistic mathematics, to be decided, so far as any decision is possible, by experiment and observation. What pure mathematics asserts is merely that the Euclidean propositions follow from the Euclidean axioms, *i.e.*, it asserts an implication: any space which has such and such properties has also such and such other properties. Thus, as dealt with in pure mathematics, the Euclidean and non-Euclidean Geometries are equally true: in each nothing is affirmed except implications. All propositions as to what actually exists, like the space we live in,

belong to experimental or empirical science, not to mathematics." [1]

Now, it is open to us, if we choose, to endeavour to construct an Economic Science either of the pure type represented by pure mathematics or of the realistic type represented by experimental physics. Pure economics in this sense—an unaccustomed sense, no doubt—would study equilibria and disturbances of equilibria among groups of persons actuated by any set of motives x. Under it as special cases would be included, at once an Adam-Smithian Political Economy, in which x is given the value of the motives assigned to the Economic man, or to the normal man, and a non-Adam Smithian Political Economy, corresponding to the geometry of Lobatschewsky, under which x consists of love of work and hatred of earnings. For Pure Economics both these Political Economies would be equally true; it would not be relevant to inquire what is the value of x that exists among the actual men who are living in the world now. Contrasted with this pure science stands what I call Realistic Economics, the interest of which is concentrated upon the world known in experience, and in no wise extends to the commercial doings of a community of angels. Now, if our end is practice, it is obvious that a Political Economy on the pattern of a Lobatschewsky or a Riemann would be for us merely an amusing toy. It will

[1] *Principles of Mathematics*, p. 5. I have substituted *realistic* for Mr. Russell's word *applied* in the preceding passage.

be the realistic and not the pure science that will constitute the object of our search.

§ 8. Closely connected with this point, however, there is a second. If it is plain that a science of the pure type will not serve our purpose, it is equally plain that Realism, in the sense of a mere descriptive catalogue of observed facts, will not serve it. Infinite narration *by itself* can never make forecast possible. What would be the effect of the imposition of a 2*s.* duty on wheat imported from foreign countries? What would be the effect of the legal enforcement of a minimum wage of given amount? Intimate knowledge of all the facts in the world could not of itself enable us to deal with problems such as these. Before they can yield any forecast, facts must be passed upon by reason. Beside the brute facts, there must be what Browning calls "Something of mine, which, mixed up with the mass, made it bear hammer and be firm to file." It is just the presence of this *something* that is essential to Realistic Science as distinguished from the realism of mere description. In Realistic Science facts are not simply brought together; they are compelled by thought to *speak*.[1]

[1] Of course this distinction between thought and fact is not an ultimate one. As Carveth Read observes in his *Metaphysics of Nature*: "Thought is immanent in perception, and perception is implied in all thought. We may say that the most characteristic [operations] of thought are the scientific processes of classification and explanation, and these are plainly involved in the present perception; for I classify in saying that I see oaks, chestnuts and fir-trees; and I explain in saying that I hear the noise of a river that cannot be seen" (p. 20).

As M. Poincaré well writes: "Science is built up of facts as a house is built of stones; but an accumulation of facts is no more a science than a heap of stones is a house." [1] Astronomical physics is not merely a catalogue of the positions which certain stars have been observed to occupy on various occasions. Biology is not merely a list of the results of a number of experiments in breeding. Rather, every science, through examination and cross-examination of the particular facts which it is able to ascertain, seeks to discover the general laws of whose operation these particular facts are instances. The motions of the heavenly bodies are exhibited in the light of the laws of Newton; the breeding of the blue Andalusian fowl in the light of that of Mendel. These laws, furthermore, are not merely summaries of the observed facts re-stated in a shorthand form. They are *generalisations*, and, as such, extend our knowledge to facts that have not been observed, may be that have not as yet even occurred. On what philosophical basis generalisations of this sort rest I am not here concerned to inquire. My point is that in every realistic science they are *made*. As Mr. Whetham, speaking of physics, puts it, any such science "seeks to establish general rules which describe the sequence of phenomena in *all* cases." [2] It is only by reference to these general rules that the forecasts, which practice needs, are rendered possible. It is in their fundamental aspect as an

[1] *Science and Hypothesis*, p. 141.

[2] *Recent Developments in Physical Science*, p. 30. The italics are mine.

organon of laws, and not in their superficial aspect as a description of facts, that the realistic sciences have bearing upon the conduct of affairs. The establishment of such an organon adapted and ready for application to particular problems is the ideal at which they aim.

§ 9. Now, according to the degree of approximation towards this ideal which different sciences have attained, the light that can be thrown upon any problem by reference to their general laws varies in brightness. In the time that remains to me I propose to ask what is the measure of that brightness in the special case of Economics. This question I shall try to answer in three separate parts.

§ 10. First, Economics, like every other realistic science, is an organon, not of construction only, but also of criticism. I postpone the question as to what *positive* information it can afford concerning the effect of contemplated legislative (or other) changes. The point I wish now to urge is that it can give much *negative* information as to the value of the arguments on which advocates and opponents of those changes rely. Though it may not be able to say what effects *will* follow, it *can* say that plausible arguments, on the strength of which certain effects are popularly expected to follow, are invalid. In this way, even when impotent to offer guidance, it can check misguidance. In the natural sciences this office is, no doubt, one of minor importance. The persons who investigate problems of causation in those fields and

who are responsible for practice based on the conclusions they have reached are, for the most part, trained students. The practice of medicine and surgery, for example, is not easily open to persons who substitute for study what they term common-sense. Hence, the scope for bad arguments and irrational practice is comparatively small, and the removal of misguidance is not a crying need. As regards the health of society, however, most persons possessing the Parliamentary franchise, and some persons not possessing it, believe themselves, not merely to be competent, but to be bound in solemn duty, to prescribe for the social patient from the vantage point of complete ignorance concerning social science. The consequence is that arguments repugnant to any form of logical reasoning are always in the air, and are always liable to influence the policy of a Democratic State. In this way misguidance is specially dangerous, and, therefore, the criticism of it specially important. To show the kind of criticism that I have in mind, I propose to say something about two of the principal pitfalls into which untrained common-sense, when reasoning on economic affairs, is liable to fall. These two pitfalls are, first, the false assertion of causal connection between observed consequents and observed antecedents through failure to observe some relevant antecedent; secondly, a like false assertion through failure to observe some relevant consequent.

§ 11. The first sort of error—the fallacy *post hoc ergo propter hoc*—is almost always present in popular discussions of taxation. When it is a question, for

example, of forecasting the effect on price of an import duty on some commodity, common-sense is apt to use two arguments. The one is that a duty of this sort was imposed at such a place at such a time; that, before the imposition of the duty, the price was so much, after it such another amount; that, *therefore*, the effect of the duty is measured by the difference between these two amounts. The other argument is that at one place a duty exists, at another it does not; that, where the duty exists, the price is so much, where it does not exist, such another amount; that, *therefore*, the effect of the duty is measured by the difference between these amounts. Both arguments implicitly assume that there are no causes present which would tend to make prices at the two points of time or space different whether duties were involved or not. In general, however, there are many such causes present. That this is *likely* to be the case is plain *a priori*: that it *is* the case is shown by the fact that, with careful selection of the instances to which this common-sense reasoning shall be applied, one man can prove that the effect of a given duty on a given thing is to raise prices enormously, another that it is to reduce them. A more subtle form of the same fallacy is displayed in such an argument as the following. Observation and statistics prove that those industries which work the shortest hours have the highest wages. Nor is this all; in many industries, as hours have fallen wages have risen. Therefore, on the principle of concomitant variations, a shortening of the hours of labour will cause wages

to rise. Now, this conclusion may, no doubt, in some instances, be correct; but the argument on which it is based and made general is wholly bad; for the real reason why short hours and high wages are in a measure correlated is not that the one causes the other, but that something else, namely, an enhancement of industrial efficiency, causes them both. Observation and statistics in a similar manner prove that the presence of a pepper-pot and the presence of a salt-cellar on dinner-tables are correlated; but it would be erroneous inference to assert that, by depositing a pepper-pot there, I could cause a salt-cellar to join it.

§ 12. The second sort of error to which common-sense is exposed is failure to observe more than a part of the effects of a cause and to mistake this part for the whole. A good illustration is afforded by the problem of determining the effect of a protective tariff in attracting or repelling capital. For common-sense—embodied in Protectionist newspapers—the matter is settled by a tabulated list of foreign firms that have started works in protected countries: for common-sense—embodied in Free Trade newspapers—by a similar list of firms native to protected countries that have set up works outside them. By means of a list of the second sort, an American writer favourable to Free Trade proves in one part of his book that "a protective tariff drives your manufactories to foreign countries": and also, for a different purpose, in another part of the same book, by means of an equally long list of the first sort,

inadvertently proves precisely the opposite.[1] In reality, of course, any proof fashioned in this way is worthless. The effect of protective tariffs in attracting and repelling capital does not operate solely where the owners of works in one country set up a branch in another: it operates also, and in general to a much greater extent, by way of the ordinary investments of private persons. To examine it by means of these lists alone is to mistake a part of an effect for the whole. A less obvious instance of the same fallacy occurs when people try to prove that strikes are bad policy from the standpoint of the workpeople by showing that the eventual gain in wages obtained by successful strikes seldom makes up for the loss suffered during the actual progress of those strikes. Such an argument ignores the fact that, when employers know that their workers are prepared to strike, this knowledge may often cause them to make concessions without any strike actually occurring. In other words, it ignores the fact that strikes, by engendering respect for the workmen's strength, may have an indirect and general effect upon the level of wages as well as a direct and particular one.

§ 13. I pass to the second division of my subject. Besides negative or critical information, Economics can also provide positive information, in the form of a *qualitative* analysis of the *kind* of relation subsisting between causes and effects. The character of this information and the measure of value that it may have for statesmanship can, it seems to me, be

[1] *Vide* Pierce, *The Tariff and the Trusts*, pp. 173 and 355.

best indicated by an attempt to exhibit it in connection with some concrete practical problem. The problem I have selected is the great problem of Unemployment. I do not, of course, profess, as an incident in a general lecture, to introduce any adequate discussion of that problem. My purpose is merely to refer to a few points as illustrations of the practical bearing of our science.

What we mean by the problem of Unemployment as presented in this country in modern times is the fact that a number of artisans and labourers, able and willing to work, find themselves frequently—and sometimes for long periods together—without a job, and, consequently, without wages. The first thing to be noticed about this problem is that, whereas in respect of such trades as building, engineering, shipbuilding, printing and furnishing, it is, in varying degrees, very grave, in coal mining and in the textile industries it is, apart from such things as strikes, comparatively insignificant. What is the reason of that? The reason is that British industries fall broadly—I am speaking here, of course, very broadly—into two groups, one of which meets fluctuations in business mainly by varying the number of its hands, while the other meets them mainly by varying the number of hours per week that all its hands work. A fluctuation in demand, therefore, that leads in the first group to what we ordinarily understand by Unemployment, leads in the second group only to "short time." In that, of course, there are evils as in the other case; but the special evils of distress and demoralisation, that we are

accustomed to associate with the idea of a mass of men thrown out of work altogether, are not present there in nearly the same measure. What, then, we naturally ask, is the reason for this distinction between the two sorts of industries? The answer is suggested by observation. The industries that vary the number of their hands are, for the most part—I still speak very broadly—industries working on a system of time-wages: the industries that vary the hours of all their hands are mainly industries working on a system of piece-wages. Bringing reason to the aid of observation, we perceive that this broad correlation is not accidental. It is the custom of Trade Unions to insist on a standard rate of wages for their members, and departures from this standard to correspond with the varying efficiency of individual workmen are not readily allowed. The consequence is that, where time-wages prevail, the wages of different workmen generally approximate to one another more closely than the real worth which the workmen have to the employer. The result is evident. It is to the interest of employers to meet declensions in demand by dismissing some of their hands and not by working short time; because, though they might reduce the wages bill by the same amount in both cases, dismissals can be concentrated upon workmen who are abnormally expensive relatively to their worth, while short time must be spread over expensive and inexpensive men equally. Therefore, under time-wages the method of dismissal tends to prevail. Under a piece-wage system, however, since the standard wage refers to the task and

not to the hour, the relation between expensiveness and worth of work done in respect of any one workman must be very nearly the same as it is in respect of any other. Hence, the advantage that the employer under time-wages finds in the method of dismissals is greatly reduced, and certain other causes that favour the method of short time are given an opportunity to assert themselves.[1] The practical moral is obvious. Any action on the part of Trade Unions in discouragement of reasonable piece-work arrangements, and, in like manner, where time-wages continue to prevail, any undue insistence upon rigid and inelastic standards that hinder the grading of wages in correspondence with efficiency, are stumbling-blocks in the way of a form of business organisation that does much to mitigate the worst evils of unemployment.

§ 14. Turn to another point. Studying such facts as are available in regard to industries in which the problem of unemployment is important, we perceive that the quantity of unemployment—the number of would-be workers out of a job—fluctuates in a two-fold manner. Most obvious, of course, are those short-lived seasonal fluctuations of which everybody is aware. But also, underlying these seasonal fluctuations, there are periodic or cyclical fluctuations, which appear in nearly all industries, and the upward and downward movements of which occupy several years. In some industries, building, for example,

[1] Cf. Mr. (now Sir H.) Llewellyn Smith's evidence to the Committee on Distress for Want of Employment.

seasonal fluctuations are the more prominent. In other industries, however, of which engineering is a good instance, the cyclical fluctuations predominate. Furthermore, even in such trades as building, the importance of these cyclical fluctuations is greater than appears at first sight. For the seasonal fluctuations are dependent on them in such wise that their range is larger in the bad years of the cycle period and smaller in the good years. The causes of these cyclical movements are exceedingly complex. Among them are such apparently remote things as recent wars, company law, the organisation of banking and currency, the working of grain futures and cotton futures, the development of the means of transport and communication between different parts of the world. In these alien fields economic analysis reveals the beginnings of circuitous routes along which it may be practicable to take action in mitigation of the evils of unemployment. It shows how seemingly disconnected proposals, such as the late Lord Goschen's plan for the introduction of £1 notes, or the suggestion of Jevons and other economists that the State should authorise the use of a tabular standard of value, because they would diminish fluctuations in discount and in prices, hold an important place among possible practical means of diminishing the normal range of unemployment.

§ 15. One more point in this connection. At a time like the present, when the difficulty of finding work is more than usually severe, it is natural that debate should centre round schemes for dealing with

the present evil rather than round methods of coping with its remoter causes. The fundamental issue in this debate concerns the effect of levying rates and taxes for the purpose of setting unemployed men to work. Look for a moment at that problem.

One view, recently expressed in Parliament, runs thus: If you employ public monies in this way, you take funds, which would have been used by private persons in the employment of better workmen on tasks that are wanted, to use them in employing worse workmen on tasks that are not wanted. You, therefore, tend to impoverish the community without really lessening the aggregate mass of unemployment. This view is attractively simple; but economic analysis shows that it ignores two important considerations. First and most evidently, it ignores the fact that in the twentieth century the unemployed cannot be allowed to starve; that, therefore, if they are not given work, they will certainly be given maintenance either by private charity or by the Poor Law; that, therefore, the money spent in setting up relief works and so on is, in great measure, money that would otherwise have been spent in charitable and Poor Law grants, and not money that would have been used in employing labour in private industry. Nor is this all. Even apart from that consideration, it would not be true that the levying of rates and taxes for relief works would contract private industry by an amount *equal* to the expansion of public industry. It would, no doubt, contract it to *some* extent. But it is probable that only a part of the extra taxes people had to pay would be taken from funds they would otherwise

have devoted at that time directly or indirectly to wage-payment. Hence, the true result of relief works and so on is not to leave the aggregate amount of unemployment in the country unaltered, but to diminish that amount. There are more people at work than there would otherwise have been.

A second and conflicting view starts from the recognition of this fact. It proceeds to admit that, if work is made for the unemployed in any way, some direct and immediate element of economic loss is probably involved; for, if it were not so, there would be no need of appeal to philanthropy or to rates and taxes. Substantially what happens is this: people are paid six bushels of wheat for doing work that only produces five. The community buys work from the unemployed for more than that work is worth. If all persons in the community were equally well-to-do, this would be an evil. As a matter of fact, however—the argument runs—the rate-payers and tax-payers are relatively rich and the unemployed relatively poor. Therefore, a transference of money between these two groups, even if there is some incidental loss upon the way, always increases satisfaction, and is, therefore, economically advantageous.

To the economist this view, like the other, seems inadequate, because it is short-sighted. He sees in relief-works much more than a dignified means of transferring money from the rich to the poor. That transference is the immediate and obvious, but it is not the most important, thing. The questions he asks are: How far will the establishment of relief-

works in times of stress save men from that permanent demoralisation and loss of efficiency that a long period of unemployment might otherwise entail? How far, on the other hand, will the prospect of relief-works check individual or associated effort on the part of the men to master two complementary sorts of industry, to move readily from districts where trade is bad to districts where it is good, to develop a system of Trade Union or other form of mutual insurance? These questions, and similar questions concerning the supply of capital, are less obvious, but not less important, than the more straightforward questions that first present themselves to the plain man. Economic science directs attention to these things, and exhibits unseen and slowly-working effects that are often of more real significance than the effects that are rapid and seen. In respect of nearly all practical problems—the one I have taken is merely an example—it can render this sort of service in some measure. It can tell us what questions to ask, and what *kind* of answer we may expect. This work in social science, as in metaphysics, is of very high importance.

§ 16. But I do not wish to end with a claim as to what Economics *can* do. There remains the third division of my subject. Capacity to criticise popular arguments and capacity, by aid of qualitative analysis, to point the road to sound inquiry provide but a small part of what is needed for guidance in social reform. Full guidance requires capacity to estimate the probable effect of causes with some reasonable

measure of quantitative precision. It is quantitative, and not qualitative, information as to the effect of causes that has the greatest value for practice. Capacity to provide *that* information Economic Science at present almost entirely lacks.[1] Before the application of general laws to particular problems can yield quantitative results, these laws themselves must be susceptible of quantitative statement. The law is the major premiss and the particular facts of any problem the minor. When the statement of the law lacks precision, the conclusion must generally suffer from the same defect. And, unfortunately, no economic law can be stated in an exact form. The physicist can express the relation between distance and attractive force with arithmetical precision. The gravitation constant is almost the same always and for all sorts of matter. But the fundamental things in the economic world—the desires and aversions of groups of people towards different sorts of commodities and services—are not thus simple and uniform. We are in the position in which the physicist would be if tin attracted iron in the ratio of the cube of its distance one year and the square of its distance the next, and if copper attracted lead in some other ratio. We cannot say, as he can of his attractions, that the amount offered or required of every several commodity is always the same specified function of the price. All that we can say in this general way is that it is *some* one of a

[1] Cf. Marshall, "The Old Generation of Economists and the New," in the *Quarterly Journal of Economics*, vol. ix.

specified large family of functions of the price. Hence, in Economics there is not, as in Dynamics, one fundamental law of general application, but a great number of laws, all expressible, as it were, in equations of similar form but with different and varying constants. Partly on account of this multiplicity and variability, the determination of those constants, or to put the matter broadly, the measurement of the elasticities of demand and supply, is a task of great technical difficulty—difficulty so great that the progress hitherto made in it has been extremely small. We can, indeed, as a general rule, by a careful study of all relevant facts, learn *something* about these elasticities, but we cannot ascertain their magnitude with any degree of exactness. In other words, our fundamental laws, and, therefore, inferences from these laws in particular cases, cannot at present be thrown into any quantitatively precise form. The result is that, when, as often happens, a practical issue turns upon the balancing of opposing considerations, even when these considerations are wholly of an economic character, Economic Science must almost always speak with an uncertain voice.

§ 17. Here, then, there remains a great gap to be filled, and the difficulty of even partially filling it is enormous. The knowledge by whose aid we hope to forward national well-being is not to be gained easily. The citadel of social evil will not yield to any assault, however fierce, unless it is well prepared. But to confess our weakness is not to diminish our

claim upon the service of those who care for the well-being of the poor. Great progress has been made in recent years: I stand in the place of one who has been and is the leader in it. There is a real and living work to be done. I do not doubt that, in the future as in the past, there will be found in Cambridge men eager and able to advance that work.

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